CLAIMS

1. A vehicular vision system, comprising:

an image sensor comprising a silicon substrate and a first passivation layer material;

a first antireflective coating between at least a portion of said silicon substrate and said first passivation layer material

a second antireflective coating on at least a portion of a side of said first passivation layer material opposite from said silicon substrate;

said image sensor being at least partially within an encapsulated package;

a third antireflective coating on at least a portion of said encapsulated package;

non-silicon features within a pixel region of said image sensor, wherein said at least a portion of said non-silicon features are coated with a light ray absorptive material;

a light source, said light source is configured to emit light rays in the non-visible spectrum to illuminate objects within a scene external to a controlled vehicle beyond an exterior surface of a windshield, wherein said light source is configured to operate in synchronous relationship with acquisition of images from said image sensor;

a spectral filter located between said image sensor and the scene, wherein said spectral filter is configured to substantially block light rays other than the predominant spectral band of light rays emitted by said light source; and

a control system configured to activate said light source and to acquire images from said image sensor.

2. A vehicular vision system as in claim 1 wherein said spectral filter is configured to substantially block light rays other than light rays emitted from said light source from being incident upon said image sensor.

3. A vehicular vision system as in claim 1 wherein said control system is configured to acquire at least one first image while said light source is at least partially energized and is configured to acquire at least one second image while said

light source is de-energized and is configured to generate a synthetic image by subtracting the second image from the first image on a pixel by pixel basis.

4. A vehicular vision system as in claim 1 wherein said light source is configured to be at least partially energized and at least partially de-energized in succession to produce a coded pattern and said control system is configured to acquire a series of images and identify said coded pattern.

5. A vehicular vision system, comprising:

an array of pixel sensors, wherein at least a portion of said pixel sensors comprise substantially no attenuating spectral filter, at least a portion of said pixel sensors comprise an at least partially attenuating spectral filter and at least a portion of said pixel sensors comprise a highly attenuating spectral filter.

6. A vehicular vision system as in claim 5 wherein said spectral filters define a pattern selected from the group comprising: a checkerboard, striped and mosaic.

7. A vehicular vision system as in claim 5 further comprising a control system configured to acquire signals from groups of uniquely filtered pixel sensors separately from other groups of differently filtered pixel sensors.

8. A vehicular vision system as in claim 7 wherein said control system is further configured to generate a synthetic high dynamic range image from the individually acquired groups of uniquely filtered pixel sensors.

9. A vehicular vision system as in claim 1 configured for use in an apparatus selected from the group comprising: rear vision, collision avoidance, obstacle detection, adaptive cruise control, rain sensing, exterior light control, and lane departure warning.

10. A vehicular vision system, comprising:

an image sensor comprising a silicon substrate and a passivation layer material; and

a first antireflective coating between at least a portion of said silicon substrate and said passivation layer material.

11. A vehicular vision system as in claim 10 wherein said first antireflective coating comprises an index of refraction between a refraction index of silicon and a refraction index of said passivation layer material.

12. A vehicular vision system as in claim 11 wherein said first antireflective coating is selected from the group comprising: titanium dioxide and diamond.

13. A vehicular vision system as in claim 12 wherein said first antireflective coating is titanium and is deposited by one of the methods selected from the group comprising: sputtering and evaporation.

14. A vehicular vision system as in claim 12 wherein said first antireflective coating is diamond and is deposited by chemical vapor deposition.

15. A vehicular vision system as in claim 10 wherein said passivation layer material is silicon-dioxide.

16. A vehicular vision system as in claim 15 wherein said passivation layer material is approximately 5μm thick.

17. A vehicular vision system as in claim 14 wherein said first antireflective coating is approximately 100nm thick.

18. A vehicular vision system as in claim 10 further comprising a second antireflective coating on a side of said passivation layer material opposite said silicon substrate.

19. A vehicular vision system as in claim 10 configured for use in an apparatus selected from the group comprising: rear vision, collision avoidance, obstacle

detection, adaptive cruise control, rain sensing, exterior light control, and lane departure warning.

20. A vehicular vision system, comprising:

an image sensor comprising a silicon substrate and a passivation layer material; and

an antireflective coating on at least a portion of a side of said passivation layer material opposite from said silicon substrate.

21. A vehicular vision system as in claim 20 configured for use in an apparatus selected from the group comprising: rear vision, collision avoidance, obstacle detection, adaptive cruise control, rain sensing, exterior light control, and lane departure warning.

22. A vehicular vision system, comprising:

an image sensor comprising a silicon substrate in an encapsulated package; and

an antireflective coating on at least a portion of said encapsulated package.

23. A vehicular vision system as in claim 22 configured for use in an apparatus selected from the group comprising: rear vision, collision avoidance, obstacle detection, adaptive cruise control, rain sensing, exterior light control, and lane departure warning.

24. A vehicular vision system, comprising:

an image sensor comprising non-silicon features within a pixel region, wherein said at least a portion of said non-silicon features are coated with a light ray absorptive material.

25. A vehicular vision system as in claim 24 configured for use in an apparatus selected from the group comprising: rear vision, collision avoidance, obstacle detection, adaptive cruise control, rain sensing, exterior light control, and lane departure warning.

26. A vehicular vision system, comprising:

an image sensor and a light source, said light source is configured to emit light rays in the non-visible spectrum to illuminate objects within a scene external to a controlled vehicle beyond an exterior surface of a windshield, wherein said light source is configured to operate in synchronous relationship with acquisition of images from said image sensor.

27. A vehicular vision system as in claim 26 configured for use in an apparatus selected from the group comprising: rear vision, collision avoidance, obstacle detection, adaptive cruise control, rain sensing, exterior light control, and lane departure warning.

28. A vehicular vision system as in claim 26 further comprising a control system.

29. A vehicular vision system as in claim 28 wherein said light source is configured to be at least partially energized and at least partially de-energized in succession to produce a coded pattern and said control system is configured to acquire a series of images and identify said coded pattern.

30. A vehicular vision system as in claim 29 wherein said code is uniquely configured to prevent a light source from oncoming vehicles equipped with similar night vision systems from causing blooming in each others images.

31. A vehicular vision system as in claim 28 wherein said control system is configured to acquire at least one first image while said light source is at least partially energized and is configured to acquire at least one second image while said light source is de-energized and is configured to generate a synthetic image by subtracting the second image from the first image on a pixel by pixel basis.

32. A vehicular vision system as in claim 26 wherein said light source is a broadband emitter having a visible light ray blocking filter.

33. A vehicular vision system as in claim 26 wherein said light source is a narrow band emitter.

34. A vehicular vision system as in claim 33 wherein said light source comprising at least one light emitting diode.

35. A vehicular vision system as in claim 34 wherein said light source emits light rays in the range from approximately 780nm to approximately 1100nm.

36. A vehicular vision system as in claim 34 wherein said light source is pulsed with momentary energy levels that exceed a one hundred percent duty cycle level.

37. A vehicular vision system as in claim 26 wherein said image sensor further comprising a narrow band pass spectral filter.

38. A vehicular vision system as in claim 37 wherein said spectral filter is placed between said scene and said image sensor.

39. A vehicular vision system as in claim 26 wherein said light source is pulsed according to a predetermined pattern indicating a code.

40. A vehicular vision system as in claim 39 wherein images are acquired from said image sensor coordinated to said predetermined pattern.

41. A vehicular vision system as in claim 26 wherein said light source is a near infrared laser.

42. A vehicular vision system as in claim 26 further comprising an AC ballast.

43. A vehicular vision system as in claim 42 wherein said AC ballast is configured to synchronously strike an arc with high intensity when an image is acquired from said image sensor.

44. A vehicular vision system as in claim 37 wherein said band pass spectral filter is selected from the group comprising: a movable shutter, a visible light absorbing LCD, an electrochromic filter and a suspended particle device.

45. A vehicular vision system as in claim 26 configured for use in an apparatus selected from the group comprising: rear vision, collision avoidance, obstacle detection, adaptive cruise control, rain sensing, exterior light control, and lane departure warning.

46. A vehicular vision system as in claim 26 further comprising a spectral filter located between said image sensor and the scene, wherein said spectral filter is configured to substantially block light rays other than the predominant spectral band of light rays emitted by said light source.

47. A vehicular vision system, comprising:

a control system configured to receive images from an image sensor and to construct a synthetic high dynamic range image from a plurality of individual images having varying exposure times.

48. A vehicular vision system as in claim 47 wherein said control system is configured to receive an image having an exposure time of approximately 1ms, an image having an exposure time of approximately 6ms and an image having an exposure time of approximately 36ms.

49. A vehicular vision system as in claim 47 wherein said synthetic high dynamic range image is stored to a memory location.

50. A vehicular vision system as in claim 47 wherein said control system is configured to calculate the logarithmic value of individual pixels within said synthetic image.

51. A vehicular vision system as in claim 47 configured for use in an apparatus selected from the group comprising: rear vision, collision avoidance, obstacle

detection, adaptive cruise control, rain sensing, exterior light control, and lane departure warning.

52. A vehicular vision system, comprising:

a control system configured to identify individual light sources within a scene by finding distinct peaks within an image.

53. A vehicular vision system as in claim 52 wherein said control system is further configured to identify at least one property of at least one light source selected from the group comprising: peak brightness, centroid, size, color, color at peak, total grey scale value, and boarder.

54. A vehicular vision system as in claim 52 wherein said control system is further configured to generate an object list history comprising at least one of said properties correlated to at least one given light source.

55. A vehicular vision system as in claim 52 configured for use in an apparatus selected from the group comprising: rear vision, collision avoidance, obstacle detection, adaptive cruise control, rain sensing, exterior light control, and lane departure warning.

56. A vehicular vision system comprising a method of creating a synthetic high dynamic image, wherein said method comprises the steps of:

acquiring at least two individual digital images of substantially the same scene utilizing a image sensor having an array of pixel sensors wherein each individual image comprises a unique maximum light detection level;

applying a scaling factor to the individual images to normalize individual pixel sensor values; and

adding the individual images together on a pixel by pixel basis.

57. The method of claim 57 wherein the individual images represent groups of pixel sensors within the image sensor having similar attenuation spectral filtering.

58. The method of claim 57 wherein the individual images represent images obtained from the same image sensor utilizing different integration periods for each image.

59. A vehicular vision system comprising a method of detecting objects within a synthetic high dynamic range image, wherein said method comprises the steps of:

providing a synthetic high dynamic range image; and

examining said synthetic high dynamic range image to find distinct peaks.

60. The method of claim 59 wherein said distinct peaks are found by raster scanning the image to find a pixel with a grey scale value higher than a threshold, determining the brightness gradient in each direction from a given pixel sensor, determine the highest brightness gradient from said given pixel, moving on to another pixel sensor in the direction of said highest brightness gradient, continuing until the brightness gradient is negative in all directions from a given pixel.